

P1 1190105

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July 07, 2004

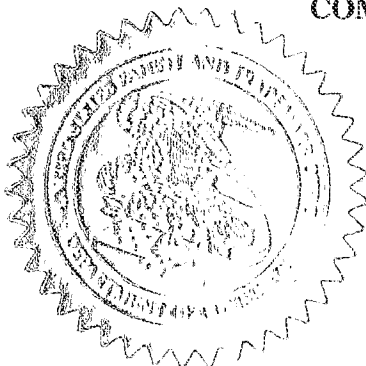
THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE.

APPLICATION NUMBER: 60/462,748

FILING DATE: April 13, 2003

RELATED PCT APPLICATION NUMBER: PCT/US04/11710

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M. SIAS
Certifying Officer

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SEQ ID NO: 146 also contains an open reading frame comprising SEQ ID NO: 147. The invention includes a polypeptide comprising SEQ ID NO: 147. SEQ ID NO: 147 is set forth below.

SEQ ID NO: 147

MFIFLLFLTSTSGSDLDRCTTFDDVQAPNYTQHTSSMRGVYYPDEIFRSDTLYLTQDLFLP
FYSNVTGFHTINHTFGNPVIFPKDGIYFAATEKSNVVRGWVFGSTMNNKSQSVIHNSTN
VVIRACNFELCDNPFPAVSKPMGTQHTMIFDNAFNCTFEYISDAFSLDVSEKSGNFKHL
REFVFKNKDGFLYVYKGYQPIDVVRDLPSGFNTLKPIFKLPLGINITNFRAILTAFSQAQDI
WGTSAAAYFVGYLKPTIFMLKYDENGTTTDAVDCSQNPLAELKCSVKSFEDKGIYQTS
NFRVVPBGDVVRFPNTNLCPFGEVFNATKFPVSVAWERKKISNCVADYSVLYNSTFFST
FKCYGVSATKLNLDLCSNVYADSFVVKGDDVRQIAPGQTGVIADYNYKLPDDFMGCVL
AWNTRNIDATSTGNYNYKYRYLRHGKLRPFERDISNVPFSPDGKPCITPPALNCYWPLND
YGFYTTTGIGYQPYRVVLSFELLNAPATVCGPKLSTDLIKNCQVNFNFENGLTGTGVLTP
SSKRFPQFQFGRDVSDFDTSVRDPKTSEILDISPCAFGGVSVITPGTNASSEVAVLYQDV
NCTDVSTAIHADQLTPAWRIYSTGNNVFQTQAGCLIGAEHVDTSYECPIGAGICASYH
TVSLLRSTSQKSIVAYTMSLGADSSIAYSNNTIAIPTNFSISITTEVMPVSMKTSVDCNMY
ICGDSIECANLLLQYGSFCTQLNRALSGLAAEODRNTREVFAQVKQMYKTPTLKYFGGF
NFSQILPDPLKPTKRSFIEDLLFNKVTADAGFMKQYGECLGDINARDLCAQKFNGLTVL
PPLLTDDMIAAYTAALVSGTATAGWTFGAGAAALQIPFAMQMA YRFNGIGVTONVLYEN
QKQIANQFNKAISQIQESLTTTSTALGKLQDVVNQNAQALNTLVKQLSSNFGAIISSVLNDI
LSRLDKVEAEVQIDRLITGRQLSLQTYVTQQLRAAEIRASANLAATKMSECVLGQSKRV
DFCGKGYHLMSPQAAPHGVVFLHVTYVPSQERNFTTAPAICHEGKAYFPREGVVFVNG
TSWFTIQRNFFSPQIITTDNTFVSGNCDVVIGIHNNTVYDPLQPELDSFKEELDKYFKNHTS
PDVDLGDISGINASVVNIQKEIDRLNEVAKNLNESLIDLOELGKYEQYIKWPWYVWLGF
AGLIAIVMVTILLCCMTSCCCLKGACSCGSCCKFDEDDSEPVLKGVKLHYT

The invention includes a polypeptide comprising an amino acid sequence having sequence identity to SEQ ID NO: 147. The invention includes a fragment of a polypeptide comprising SEQ ID NO: 147. The invention includes a diagnostic kit comprising a polypeptide comprising SEQ ID NO: 147, or a fragment thereof. The invention includes a diagnostic kit comprising a polynucleotide sequence encoding SEQ ID NO: 147, or a fragment thereof. The invention includes an immunogenic composition comprising a polypeptide comprising SEQ ID NO: 147, or a fragment thereof. The invention includes an antibody which recognizes a polypeptide comprising SEQ ID NO: 147, or a fragment thereof. SEQ ID NO: 147 demonstrates functional homology to a coronavirus spike protein.

The ORF1a and ORF1b sequences of coronaviruses are typically translated as a single ORF1ab polypeptide. Slippage of the ribosome during translation generates an a-1 frameshift. One region of such slippage is illustrated below: